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THE MORGENTHAU COLLECTION¹

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New York City

A few months ago New Yorkers were astonished and delighted to see displayed in the window of a Fifth Avenue store a small but strikingly beautiful collection of minerals. This constituted the contribution of Mr. Mengo L. Morgenthau, President of the Mirror Candy Stores, to the window displays which marked Fifth Avenue week. Mr. Morgenthau, who has quite recently become a collector of minerals, has now placed a portion of his private collection on permanent exhibition in one of his stores at 1495 Broadway. In doing this he has placed in a prominent position before the public eye a series of very fine and strikingly beautiful examples of the harmonies of form and color in minerals. These are effectively installed in wall cases, equipped with slightly sloping shelves and concealed artificial lighting, most of which are placed in a room opening into the store, thus constituting a small museum (see frontispiece).

Among the specimens, which number some 1500, are magnificent crystallized copper, calcite and massive datolite from Lake Superior; large and remarkably fine fluorite, barite and cuprite from England; a splendid series of malachite and azurite from Arizona; a wonderful collection of crystallized and nugget gold; not to mention notably large and handsome specimens all along the line. The effect of giving such prominence to a spectacularly fine assemblage of minerals may be foretold by quoting from the introduction to the catalog which is being prepared for free distribution to the public.

"Among the influences which work for the uplifting of mankind there is none more frankly obvious, more subtly potent than the appeal of the beautiful in nature. The beauty of a sunset, of a

¹ *Editorial note.*—This article inaugurates a series on "Noteworthy Mineral Collections." Contributions to this series from our readers will be welcomed.

hillside, of a garden, has in it that which touches closely those higher levels of our natures where resides the inspiration to high ideals and great endeavors. So it is that much of our art, our painting, sculpture, music, poetry owes its inspiration to the beautiful things we see in nature. But in the wealth of beautiful forms and colors in the animal world and the plant world we are rather apt to overlook the beauty of that silent hidden world of the earth beneath our feet. Here is a charm of form no less perfect than the curve of the flower petal, a delicacy of color no less exquisite than a butterfly's wing, a vividness of contrast no less striking than the plumage of a tropical bird.

"Mr. Morgenthau in gathering together this assemblage of the beautiful things of the mineral world has planted for us, as it were, a garden of the products of the rocks which make up the mass of the world. We know, of course, the vast utility of these things. We realize that for our metals, our building materials, for the coal which heats us and gives power to our machinery as well as for the jewels which adorn us, we must go to that treasure house of minerals which is locked up in the rocks. But it remains for such a collection as we find here to show us to what an extent in emphasizing the utility of a mineral we have missed its beauty. Malachite not only gives us an important source of copper but it delights our eye with a soft velvety green deeper than the grass and more restful than the sea. Cerussite not only furnishes us with dull though eminently useful lead, but it also bewilders us with a delicate white network of interwoven rods more mathematically perfect than a spider's web."

In placing before the public this splendid collection of the beautiful and the interesting in minerals, a collection which is most admirably displayed and lighted, Mr. Morgenthau has expressed the hope that the interest which he has thus aroused may induce many who see it to visit and study the large Mineral Collection of the American Museum of Natural History. Few of those who are privileged to see the Morgenthau Collection realize that in the American Museum of Natural History the New York public has access to one of the five largest and finest mineral collections of the world, and it is confidently hoped that here our eyes may be opened to the opportunities offered by this great treasury of the earth's wonders.

CLEAVABLE BORNITE FROM USK, B. C.¹

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University of Toronto

Some samples of bornite recently obtained from an auriferous copper prospect near Usk, B. C., exhibit an unusually perfect cleavage. Generally this mineral presents only traces of octahedral cleavage, but in the specimens referred to the cleavage was almost as perfect as that of fluorite, with surfaces up to two centimeters in diameter. Some fragments which were measured on the goniometer gave angles well in accord with the theory for octahedral cleavage.

In some parts of the cleavage masses it is quite apparent that the bornite is no longer pure, but that there is also present a considerable proportion of a mineral resembling chalcocite. With a view to determining the general purity of the bornite, Mr. J. E. Thomson, of the University of Toronto, prepared three polished surfaces for "mineragraphic" observation. The intermingling of bornite and chalcocite was plainly seen, the latter being chiefly along cleavage planes in the former. By means of a rectangularly-ruled glass inserted in the field of the microscope he determined the ratio of the areas occupied by the two constituents and found that on most of the polished surfaces examined the chalcocite area was twice as great as the bornite area. In one of them, however, the bornite area was 54.17% while the chalcocite area was 45.83%. The volume ratios of the minerals in the masses examined may be assumed to be proportional to the ratios of the areas. With this in view it is possible, assuming that the specific gravities of the minerals are 5 for bornite and 5.5 for chalcocite, to determine the mass ratios. Where the areas are related to one another as two of chalcocite to one of bornite, the percentage composition of the intergrowth should be—chalcocite 68.75%, bornite 31.25%.

A chemical analysis of carefully selected material made by Mr. A. C. Wheatley is shown in I.

¹ [The need of investigation of material as to its homogeneity before too much significance is attached to deductions from analyses is strikingly brought out in this contribution. Ed.]

	I.	Molecular ratio	II.
Copper	67.51%	—1.068 or 7.026	67.14%
Iron	8.49	—0.152 or 1.	8.43
Sulfur	24.88	—0.778 or 5.112	24.16
Total	100.88		99.73
Sp. gr.	5.28		5.248

An analysis of "bornite" from Ragisvaara¹ is given for comparison in II. The formula corresponding to the above analyses is $7\text{Cu}_2\text{S} \cdot \text{Fe}_2\text{S}_3$. From the evidence shown by the examination of polished surfaces it is clear that we are here dealing with a mixture of bornite and chalcocite and it is only a chance that the ratios of these two in the mixture permit the deduction of such a simple chemical formula. The Ragisvaara mineral is no doubt also a mixture. It is plainly unsafe to use occurrence of material of the same composition at two widely separated localities as a criterion of its definite character, for both may be mixtures.

As the relative amounts of chalcocite and bornite in the pieces analyzed are uncertain, it is impossible to decide whether the bornite has the formula indicated by the best modern analyses, $5\text{Cu}_2\text{S} \cdot \text{Fe}_2\text{S}_3$, or favors the view of Kraus and Goldsberry² that bornite is variable in the ratio of Cu_2S to Fe_2S_3 .

This intergrowth might be interpreted as derived from a natural cubic cuprous sulfide possessing a perfect octahedral cleavage, by the alteration, in part, to bornite. In view of the relations between the two minerals shown on mineragraphic study, however, the writer is inclined to interpret the mixture as partial alteration of unusually cleavable bornite to chalcocite.

CRISTOBALITE IN THE SPHERULITIC OBSIDIAN FROM YELLOWSTONE NATIONAL PARK³

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Stanford University, California

The various forms of silica furnish us with the best and most complete example of polymorphism. In addition to the common minerals, quartz, chalcedony, and opal, we have the compara-

¹ Dana, *System of Mineralogy*, p. 77.

² *Am. J. Sci.*, 37, 539. 1914.

³ [This article represents an interesting demonstration of the value of even the simplest of the modern optical methods in the recognition of the less common minerals. Ed.]

tively rare high-temperature forms, tridymite and cristobalite. The rarest of all the known silica minerals is the pseudo-isometric cristobalite, found at only a half-dozen localities in the world, and until recently not known from the United States, with the possible exception of a doubtful occurrence in a meteorite from Kendall County, Texas. In 1918, however, the writer¹ described cristobalite from two localities in California.

The object of this note is to place on record the occurrence of this interesting mineral at a third American locality. A specimen of spherulitic obsidian from the Yellowstone National Park, collected by Mr. D. F. Meiklejohn some years ago, and now in the petrographic collections of Stanford University, contains cristobalite in appreciable amounts. The exact locality of the specimen is not given, but it is presumably from Obsidian Cliff. Tridymite has been described from this locality by Iddings.²

The cristobalite occurs in a black obsidian containing numerous gray spherulites ranging from about a millimeter to a centimeter in diameter. The glass is colorless in fragments and contains minute, slender rod-shaped microlites. Its refractive index is 1.480, which proves that it is a rhyolitic obsidian high in silica.

Some of the spherulites are solid but most of them are more or less hollow, and are to be classed as lithophysae, as they show a tendency to have their contents arranged in concentric shells. The only prominent minerals of the hollow spherulites or lithophysae are short branching rods of orthoclase ($n = 1.523$), with free ends, and the cristobalite, the two being intimately associated.

The cristobalite occurs in minute (average size = 0.3 mm.) spherical aggregates and is fairly abundant. It is subtranslucent with an enamel-like appearance, which seems to be characteristic of cristobalite for I have noted it in five different occurrence. Under the microscope it is faintly birefringent with a complicated mosaic structure and shows polysynthetic twinning in spots. The refractive index is 1.485 ± 0.005 . The fact that its index is distinctly greater than that of a liquid with an index of 1.480 positively distinguishes it from tridymite, as shown by Fenner.³ On heating the cristobalite to a rather high temperature by means of a blowpipe, it may be seen to be semi-transparent when viewed with a hand lens; and, on cooling, it suddenly becomes sub-trans-

¹ *Am. J. Sci.* [4], **45**, 222-226, March, 1918.

² *Seventh Ann. Rept. U. S. Geol. Survey*, 267, 1888.

³ *Am. J. Sci.* [4] **36**, 331-384, 1913.

lucent. This is doubtless due to the change of β -cristobalite to α -cristobalite, which, according to Fenner, takes place at a temperature varying from 198 to 240° C. This simple blowpipe test may be of service in identifying cristobalite, a mineral which otherwise can only be distinguished by optical tests, and one which may have consequently been overlooked many times.

Since cristobalite is a form of silica, one would expect to find it in the persilicic (so-called acid) rocks, but all the earlier described occurrences are in andesite, auganite, or basalt. Tridymite, on the other hand, is found in rhyolite and trachyte as well as in the medio-silicic rocks. The Yellowstone Park occurrence, together with the writer's recent identification of the mineral in the rhyolitic obsidians of two localities in California, proves that cristobalite as well as tridymite is characteristic of the persilicic volcanic rocks, for, of the five American occurrences known, three are in rhyolitic obsidians. It is believed that a careful search in obsidians and related rocks will reveal the presence of cristobalite in many additional specimens.

MASSIVE LAUMONTITE FROM MONTANA

EARL V. SHANNON

*U. S. National Museum*¹

Laumontite is a mineral of the zeolite group which is ordinarily found in the form of well-developed crystals associated with related minerals as an alteration product in cavities in basic igneous rocks. The mineral is rarely found massive and is seldom present in any great quantity. Some time ago Dr. E. S. Larsen turned over to the writer a specimen of a massive earthy material with the statement that its optical properties identified it as laumontite. The mineral had been sent to the U. S. Geological Survey by Mr. Chas. P. Farnquist of Spokane, Wash., who gives the locality as near Wolf Creek Station, Lewis & Clarke Co., Mont. There are said to be several veins solidly filled with the mineral in a distance of 5 meters, the individual veins reaching a thickness of 0.6 m. In appearance the specimen resembles a compact altho somewhat friable sandy clay of a dirty grayish

¹ Published by permission of the Secretary of the Smithsonian Institution. [In contrast to the preceding article this one shows how optical methods led to the correct identification of a very unusual form of a fairly common mineral. Ed.]

pink color with an occasional bright grain giving a vitreous or pearly reflection. The aggregate can be crushed to sand with the fingers. No information regarding the wall rocks is available. The optical measurements made by Dr. Larsen are as follows: Optically negative (—); extinction apparently highly inclined; axial angle, $2V$, medium; refractive indices $\alpha = 1.505$, $\beta = 1.515$, $\gamma = 1.517$.

The material was so different in appearance from ordinary laumontite that it was examined chemically in the laboratory of the National Museum. Before the blowpipe it fuses with intumescence to a white enamel. In the closed tube yields abundant water. It is soluble in hot hydrochloric acid with gelatinization.

Upon analysis the following results, agreeing with the recognized composition of laumontite, were obtained upon the air-dried material:

SiO₂ 50.90, Al₂O₃ 21.26, Fe₂O₃ 1.66, CaO 13.91, MgO trace, MnO trace, H₂O 12.64, sum 100.37%.

The mineral is of interest in its unusual form and mode of occurrence. The instance shows with what certainty a mineral may be identified by means of its optical properties alone.

THE MINERALS OF MADISON COUNTY, MISSOURI¹

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University of Missouri

Madison County, Missouri, is noted especially for the linneite² found in the old Mine La Motte Mine. The occurrence of this rare mineral in abundance in this and nearby mines makes the area of interest, but many other minerals (one of which is known nowhere else in the United States) are found in this county.

Madison County is in the southeastern part of the state, about 145 kilometers (90 miles) south of St. Louis. It includes part of the St. Francois Mountains, which comprise an irregular series of rounded hills, some of which reach an elevation of 550 meters (1800 feet). In the eastern part of the county there are

¹[Our "Famous Mineral Localities" series, more or less interrupted during the past few months because of lack of space, recommences with this article, and will, it is hoped, be represented in every number during the current year. Ed.]

²[The simplest spelling of this name is preferred in this magazine. Ed.]

Cambrian sediments, with occasional patches of granite, granite-porphry, and rhyolite. The areas of igneous rocks increase in size to the westward to such an extent that in the western half of the county no other rocks are found.

The famous old Mine La Motte is in the northeastern part of the county and the younger mines are around Fredricktown, 8 kilometers (five miles) to the south. The Chicasaw Indians obtained lead in the district previous to 1720, and it was thru them that the lead deposits were first found, by a French mineralogist named La Motte, about 1720. These early explorers were looking for silver, but, failing to find it, they began mining the galenite.¹ Other discoveries of nearby lead deposits followed in the next decade. French people still live in one of these districts, called "Old Mines." Since 1720 mining has been carried on more or less actively on the Mine La Motte property. Much evidence of the early mining has been uncovered in the present workings.

The ores at Mine La Motte occur in sandstone and dolomite, but much residual galenite has been mined from the thick residual clays overlying these rocks, especially during the early periods of mining. The chief mineral of the ores in general is galenite. That found in the clay shows the effects of ground water, usually occurring in rounded masses, more or less pitted and almost invariably showing a thin coating of gray cerussite. Recent mining work shows that this residual clay contains considerable cerussite (occurring in small grains), frequently as high as 5 or 6 percent.

In the dolomite, especially near the surface, beautiful botryoidal forms of cerussite occur; but even more common are the radiating groups of cerussite crystals, which are often acicular. These groups attain a length of 3 to 5 centimeters. The crystals are transparent, tho occasionally stained yellow by limonite. They are found in cavities from the top of the ground to the bottom of the dolomite.

Linneite occurs mainly in the sandstone, just below the dolomite. It is found in veins, in cavities, and disseminated thru the rock. The best crystals (often one centimeter in diameter) occur in the disseminated form. The linneite in the veins

¹ [When the standard mineralogical termination *ite* can be added to a mineral name without seriously obscuring its derivation, or destroying its euphony, the uniform introduction of this ending seems desirable. Ed.]

is nearly solid and usually free from crystal faces. The crystals in cavities are fairly well developed. The usual crystal form of these is the octahedron, frequently in combination with the cube. Intergrowths are especially common. An unusual mode of occurrence was noted in cavities in the dolomite, the mineral having a radiating form similar to millerite. The fibers are coarser than those in the radiating forms of millerite and occasionally they show minute cubes along their sides. The linneite is a distinct reddish gray in color, making it easy to identify when intergrown with pyrite and marcasite, as it is at the Missouri Cobalt Company's mine, near Fredricktown. The Missouri linneite contains approximately 20% of nickel, thus making it the variety called siegenite (the isomorphous mixture of linneite and polydymite).

Two other cobalt-nickel minerals are found within the area. "Asbolite," or earthy cobalt ore, is found where the ores have been oxidized at the surface. It is compact-massive, jet black, and has a hardness of 4 to 5. The earthy variety is forming in the ores today, and is usually noticed as a black powder. Bieberite, a rare hydrous cobalt sulfate, forms as an efflorescence on the pillars in the old portions of the mine; this mineral has been found in America in but one other locality.¹ It will be described in a future paper.

Other minerals found at Mine La Motte are sphalerite (rare) chalcopyrite, massive and rarely in small poorly developed crystals intergrown with the linneite, and pyrite. Beautiful gray crystals of dolomite, and calcite in the form of very flat rhombohedrons, occur both in cavities and along fissures. Malachite is seen occasionally.

Pyrrhotite, annabergite, plumbogummite, and anglesite have been reported as occurring at Mine La Motte, but the writer has been unable to confirm these reports.

At the Missouri Cobalt Mine, about $1\frac{1}{2}$ km. southeast of Fredricktown, the following minerals are found in abundance: galenite, in splendid crystals; pyrite, massive, in crystals, and as stalactites; marcasite, massive and in crystals; linneite, as crystals and massive; chalcopyrite, massive; and sphalerite, massive. Dolomite, calcite, and occasionally a little malachite

¹ The Cornwall iron mines, Lebanon County, Pennsylvania. Genth, *Mineralogy of Pennsylvania*, *Second Geol. Survey Penna.*, Rept. B2, 149 1874. [S. G. G.]

also occur. Many old shallow diggings show both malachite and azurite.

At Silver Mine, in the western part of the county, a quartz vein, discovered early in the nineteenth century, was worked for silver in the late seventies, but was a failure as a silver mine. In 1915 it was reopened and worked for the tungsten minerals it contained. The vein, which dips southeastward about 60 degrees and strikes a little south of west, is well exposed along the side of the St. Francois River.

Much of the galenite obtained during the early mining was silver-bearing, hence the name Silver Mine. A number of minerals, some very rare in the Mississippi Valley, and one, zinnwaldite, not reported elsewhere in the United States, are found here. Quartz is the most abundant mineral in the vein. It occurs massive and as crystals. Hübnerite occurs in fairly large masses, usually bladed, and often several kg. in weight. Purple fluorite is associated with the hübnerite and the quartz. Zinnwaldite is found as rosettes, singly or in chains. These rosettes may occur in bands a centimeter or more in width, and ten to twenty or more centimeters in length. The mineral has a dirty golden brown color. It shows the twinning characteristic of this mineral and also small lines, apparently due to wrinkling, perpendicular to the face and intersecting at the twinning plane. Galenite is the most common sulfide, but pyrite, sphalerite, chalcopyrite, and arsenopyrite are also found. Sericite is developed in the wall rock. Serpentine is abundant in the vein, and bands of zinnwaldite a centimeter wide ramify thru it in various directions. Topaz, tungstite, and stolzite have been reported, but the writer has never found them.

Many small quartz veins occur in the surrounding granite and rhyolite. These contain specularite, epidote, quartz, and garnet. Brown radiating crystals of epidote are of rather frequent occurrence in cavities in the granite.

Fine specimens of glauconite can be obtained from the Cambrian dolomite of the area, this mineral often constituting 20% of the rock. Great masses of drusy quartz are found in the dolomite; less often it occurs in, or associated with, the chert.

NOTE ON THE MEASUREMENT OF THE DENSITY OF MINERALS.¹

L. H. ADAMS

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The object of this note is to call attention to the advantages of the "flat-top" pycnometer² for the accurate measurement of the density of minerals and other granular or powdered solids. This pycnometer was used and described several years ago by Dr. John Johnston and the present writer,³ and has since been used by a number of investigators, all of whom report favorably concerning its convenience and accuracy. It has recently been placed on the market.

This pycnometer differs from the older form in having the usual conical joint between stopper and bottle replaced by a plane joint, *i.e.*, the lower plane surface of the stopper rests on the upper plane surface of the pycnometer. The frequent source of error in the older form,—the insertion of the stopper to different depths in the two weighings for each determination,—is thereby effectually done away with. This form of the joint, moreover, allows it to be easily cleaned, and, when the surfaces are properly ground, no grease or other lubricant is required. A further advantage lies in the fact that the loss in weight on standing (due to the evaporation of liquid) is negligible.

For accurate measurements with powdered material it is necessary to evacuate before adding the liquid. This is readily accomplished by attaching a water-aspirator to a special stopper exactly like the ordinary stopper except for a small axial hole. The liquid is then, by a suitable device, allowed to cover the material before air is admitted.⁴

¹ [The striking variations shown in the different authors' data on the density (or specific gravity) of even the most simple and definite minerals show that something must be wrong with our methods of determination. With the idea of aiding in the attainment of greater accuracy, the Editor has requested Dr. Adams to prepare this article; and has encouraged the Empire Laboratory Supply Co. of N. Y. to manufacture the apparatus described. It is now on the market; see advertising pages.]

² Also spelled "pyknometer"; the usage of *Chemical Abstracts* is followed here.

³ John Johnston and L. H. Adams, *J. Am. Chem. Soc.* **34**, 566, 1912.

⁴ Cf. A. L. Day and E. T. Allen, *Carnegie Institution of Washington Publ.* No. **31**, p. 55; W. F. Hillebrand, *U. S. Geol. Survey Bull.* **700**, p. 55.

A certain amount of care must be exercised in placing the stopper on the pycnometer. The latter having been filled to overflowing with water (or other suitable liquid) is grasped at the neck by the thumb and finger of the left hand, and with the other hand the stopper is pushed on firmly with a sliding motion. Unless the temperature rises (in which case no bottle of this general type is satisfactory), the stopper sticks to the bottle and is not easily dislodged. The weight of the pycnometer filled with liquid can be determined to within 0.1 mg., which implies an accuracy of about 0.0001 in the density of an ordinary mineral. The convenience as well as the accuracy of this pycnometer is likely to appeal to any one who is engaged in determining densities.

NEW MINERAL SPECIES DESCRIBED DURING 1916-1920. EDGAR T. WHERRY, *Washington, D. C.*—About sixty mineral species have been described as new during the period from 1916 to 1919 (and early 1920), inclusive, and published in this magazine, either in the original or in abstracts. It seems worth while to present a classification of these, more or less according to Dana's System of Mineralogy (Ed. 6), so that their relations to previously known minerals or groups will be brought out.

The primary subdivisions, or "families," as they may perhaps be called, are as follows:

- A. Native elements, including isomorphous mixtures of elements.
- B. Sulfides, selenides, arsenides, etc., and sulfo-salts.
- C. Halides, including oxyhalides and hydroxyhalides.
- D. Oxides, including double oxides and hydroxides.
- E. Carbonates, oxalates, organic compounds; also borates.
- F. Sulfates, molybdates, etc.
- G. Phosphates, arsenates, vanadates, etc.
- H. Columbates, tantalates, titanates, etc.
- I. Silicates of all kinds.

The first four of these families are essentially as in Dana; in E, however, types of compounds are introduced which Dana scatters in various places. It seems logical to place with the carbonates all other carbon compounds, just as all sorts of silicates are grouped together; and borates, which resemble carbonates far more than they do the uranates, with which Dana groups them, also fit in well here.

The order of the last four families is exactly reversed from that of Dana, the idea being that it is well to take up compounds in the order of increasing complexity, which brings sulfates early and silicates late. Titanates are placed with columbates because of the striking isomorphism these two types of compounds show.

A. NATIVE ELEMENTS. *a.* NEW SPECIES.

NAME	FORMULA	REMARKS	REFERENCE
A. <i>b.</i> DOUBTFUL AND DISCREDITED SPECIES			
"3. Selensulphur"	S, Se	An isomorphous mixture, very low in selenium.	2, 12 and 116.
B. SULFIDES, ETC. <i>a.</i> NEW SPECIES			
Tungstenite	WS ₂	Non-crystalline, related to jordisite and molybdenite.	3, 30.
Xanthochroite	CdS + xH ₂ O	Non-crystalline, related to greenockite.	3, 158.
Bismutoplagonite	Pb ₃ Bi ₈ :Si ₇	A sulfo-salt, related to plagonite.	5, 105.
B. <i>b.</i> DOUBTFUL AND DISCREDITED SPECIES			
"Oruette"	Bi ₁₋₆ : (S, Te)	A variety of wehrlicite	4, 152.
"Cocinerite"	Cu + Ag + little S.	Nature doubtful.	4, 146.
"39. Whitneyite"	Cu ₄ As + Cu.	A mixture.	4, 91.
"Villamaninite"	Cu + Fe + much S.	Nature doubtful.	5, 168.
(unnamed)	Pb ₂ As ₄ :S ₉	Near plagonite.	5, 136.
"Mullanite"	Pb ₃ Sb ₄ :S ₁₁	Identical with boulangerite	3, 39.
"Trechmannite-alpha"		Isomorphous with trechmannite.	5, 136.
C. HALIDES, ETC. <i>a.</i> NEW SPECIES.			
Lorettoite	Pb ₇ :Cl ₂ O ₆	Optically distinct.	2, 26.
C. <i>b.</i> DOUBTFUL AND DISCREDITED SPECIES			
"Chubutite"	Pb + Cl + O	Evidently identical with lorettoite.	4, 103.

D. OXIDES, ETC. *a.* NEW SPECIES

NAME	FORMULA	REMARKS	REFERENCE
Lithargite.....	PbO	Optically distinct. Not fully characterized, but probably definite. Composition rather doubtful, but optically distinct. Orthorhombic modification.	2, 18, 19.
Lambersite.....	UO ₃		
Hoegbornite.....	Mg(Al, Fe, Ti) ₄ : O ₇		5, 17.
Baackstroemite.....	Mn(OH) ₂		4, 76. 5, 88.

D. *b.* DOUBTFUL AND DISCREDITED SPECIES

"Eldoradoite".....	SiO ₂	Variety of quartz. Mixture. Sphenoidal, but all manganite may well be the same. Colloidal adsorption product.	2, 26. 5, 136. 1, 53.
"Brostenite".....	MnO ₂ + X.		
"Paredrite".....	TiO ₂ + X.		
"Sphenomanganite".....	Mn : O(OH)		
"Cesarolite".....	PbO + <i>x</i> MnO ₂ + <i>y</i> H ₂ O		5, 86. 5, 211.

E. CARBONATES, BORATES, ETC. *a.* NEW SPECIES

Basobismutite.....	Bi ₄ : O ₄ (OH) ₂ (CO ₃)	Not fully characterized. _____ _____ Optically distinct, so given species rank.	5, 17. 5, 169. 2, 68. 5, 141. 2, 1.
Flagstaffite.....	C ₁₂ H ₁₀ O ₂		
Magnesioldwigite.....	Mg ₂ Fe''' : BO ₃		
Vonsenite.....	MgFe'''Fe''' : BO ₃		
Priceite.....	Ca ₃ : B ₁₂ O ₂₁ : 5H ₂ O		

E. *b.* DOUBTFUL AND DISCREDITED SPECIES

"301. Hydrogiobertite"	MgO + CO ₂ + H ₂ O	Mixture.	2, 3.
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F. SULFATES, ETC. *a.* NEW SPECIES

Gilpinite.....	(Cu, Fe) (UO ₂) : (SO ₄) : 4H ₂ O	Optically distinct. A hydroxy-fluo-sulfate.	2, 75. 1, 87.
Creedite.....	H ₂ Ca ₃ Al ₂ : (OH) ₄ F ₈ (SO ₄).		

F. b. DOUBTFUL AND DISCREDITED SPECIES

NAME	FORMULA	REMARKS	REFERENCE
"307. Uranothallite"	$\text{CuO} + \text{UO}_3 + \text{SO}_3 + \text{H}_2\text{O}$	Impure liebigite.	2, 87
G. PHOSPHATES, ETC. a. NEW SPECIES			
Merrillite.	$x\text{CaO} \cdot y\text{P}_2\text{O}_5$	Optically distinct.	2, 119.
Sarcopside.	$(\text{Fe}, \text{Mn})_7 : \text{F}_2(\text{PO}_4)_4$	Optically distinct, so raised to species rank.	5, 99.
Cornelite.	$\text{CaCu} : (\text{OH})(\text{PO}_4)$	Compn. uncertain.	5, 17.
Higginsite.	$\text{CaCu} : (\text{OH})(\text{AsO}_4)$	Compn. uncertain.	5, 155.
Pyrobelonite.	$(\text{Mn}, \text{Pb})_n : \text{O}_2(\text{OH})_6(\text{VO}_4)_4$	Compn. uncertain.	5, 87.
Crandallite.	$\text{H}_2\text{CaAl}_4 : (\text{OH})_6(\text{PO}_4)_2$	Compn. uncertain.	2, 42.
Arsenobismite.	$\text{Bi}_2 : (\text{OH})_2(\text{AsO}_4)$	Compn. uncertain.	1, 13.
Spencerite.	$\text{Zn}_4 : (\text{OH})_2(\text{PO}_4)_2 : 3\text{H}_2\text{O}$	Compn. uncertain.	2, 41.
G. b. DOUBTFUL AND DISCREDITED SPECIES			
"548. Hamlinite"		Same as goyazite.	2, 70.
"640. Fischerite"		Same as wavelite.	2, 32.
"651. Mazapilite"		Same as arsenosiderite.	3, 12.
"Ferrazite"	$\text{BaO} + \text{PbO} + \text{P}_2\text{O}_5$	Character uncertain.	5, 39.
"Hibbenite"	$\text{ZnO} + \text{P}_2\text{O}_5 + \text{H}_2\text{O}$	Very close to hopcite.	2, 11.
H. TITANATES, ETC. a. NEW SPECIES			
Brannerite.	$\text{Ca}(\text{UO}_2) : (\text{TiO}_2)_2 + \text{X}.$	Actually very complex in compn.	5, 105.
Oliveraite.	$\text{H}_4\text{Zr}_3\text{Ti}_2 : \text{O}_{12}$	Compn. uncertain.	4, 41.
H. b. DOUBTFUL AND DISCREDITED SPECIES			
		None reported.	

I. SILICATES. a. NEW SPECIES

NAME	FORMULA	REMARKS	REFERENCE
ANHYDROUS.			
1. PERSILICATES			
2. METASILICATES			
Margarosunite	$\text{Ca}_2\text{Pb} : (\text{SiO}_3)_3$	None reported.	1, 87.
Sobralite	(Mn, Fe, Ca, Mg) : SiO_3	Optically distinct. None reported.	4, 76.
3. ORTHOSILICATES			
4. SUBSILICATES			
Viridine	$\text{Al}_2 : \text{SiO}_6$	Optically distinct.	5, 126.
HYDROUS.			
1. PERSILICATES			
Ferriente	$(\text{Na}_2, \text{Mg})_2\text{Al}_2 : \text{Si}_5\text{O}_6 : 6\text{H}_2\text{O}$		4, 90.
Flokte	$\text{H}_8(\text{Ca}, \text{Na}_2)\text{Al}_2 : \text{Si}_9\text{O}_{26} : 2\text{H}_2\text{O}$		3, 30.
2. METASILICATES			
Eakleite	$5(\text{Ca} : \text{SiO}_3) : \text{H}_2\text{O}$	Optically distinct.	2, 111.
Riversideite	$2(\text{Ca} : \text{SiO}_3) : \text{H}_2\text{O}$	Optically distinct.	3, 19.
Leverrierite	$\text{Al}_2 : (\text{SiO}_3)_3 + x\text{SiO}_2 + y\text{H}_2\text{O}$	Compn. variable, but optically distinct, so raised to species rank.	2, 112.
Racemite	$\text{Al}_2 : (\text{SiO}_3)_3 + x\text{H}_2\text{O}$	Compn. uncertain, but optically distinct.	4, 28.
Cornuite	$\text{Cu} : \text{SiO}_3 + x\text{H}_2\text{O}$	Amorphous chrysocolla.	3, 158.
Stevensite	$\text{H}_2\text{Mg}_3 : (\text{SiO}_3)_4 + x\text{H}_2\text{O}$	Amorphous talc; raised to species rank.	1, 44.
3. ORTHOSILICATES			
Zebedassite	$\text{H}_3\text{Mg}_6\text{Al}_2 : (\text{SiO}_4)_6$		4, 120.
Crestmorite	$\text{H}_2\text{Ca} : \text{SiO}_4$		3, 19.
Ectropite	$\text{H}_2\text{Mn}_3 : (\text{SiO}_3)_2 : \text{H}_2\text{O}$		2, 128.
Hydroclinochumite	$\text{Mg}_9 : (\text{OH})_2 : (\text{SiO}_4)_4$		5, 136.
Griffithite	$\text{H}_6(\text{Mg}, \text{Fe})_4(\text{Al}, \text{Fe})_2 : (\text{SiO}_4)_6$	(+ additional H_2O)	2, 54.

I. SILICATES. *a.* NEW SPECIES

NAME	FORMULA	REMARKS	REFERENCE
4. SUBSILICATES			
Colerainite.....	$H_6Mg_2 : AlSiO_8$	—	3, 165.
Mackensite.....	$H_4Fe_3 : SiO_7$	—	4, 61.
Viridite.....	$H_6Fe_4 : Si_2O_{11}$	—	4, 61.
Plazolite.....	$H_4Ca_3Al_2 : Si_2O_{12}$	Contains some CO_2 .	5, 183.
Orvillite.....	$H_{10}Zr_8 : Si_6O_{33}$	Compn. uncertain.	4, 41.
Echellite.....	$H_8(Ca, Na_2)Al_4 : Si_3O_{17}$	Compn. uncertain.	5, 1.
DOUBLE COMPS.			
"Sulfatic cancrinite"	$x(H_2, Na_2, Ca) : yAl : z(Si, S)O_8$	Compn. uncertain.	2, 13.
Catoptrite.....	$Mn_4(Al, Fe)_4 : Sb_3Si_2O_{29}$	Compn. uncertain.	2, 129.

I. *b.* DOUBTFUL AND DISCREDITED SPECIES

"Amosite".....	—	Compn. unknown.	5, 16.
"Collbranite".....	—	Compn. unknown.	3, 177.
"Lucanite".....	—	Same as stevensite, above.	5, 18.
"Manganfayalite".....	$(Fe, Mn)_2 : SiO_4$	Variety of fayalite.	4, 76.

Note.—In preparing the above tabulation, it has not always been easy to decide whether a mineral was entitled to specific rank or not. For example, the anhydrous metasilicate sobralite, on the preceding page, is very close to certain varieties of rhodonite and to pyroxmangite. However, the describer of sobralite gave detailed optical data which appeared to distinguish it from these, and it was therefore included, because optical criteria are regarded by the compiler as the best for the establishment of a species.

The fact that one third of the minerals listed have had to be included in the "doubtful and discredited" class indicates the need for more thoro study of minerals before they are announced as new species.

PROCEEDINGS OF SOCIETIES

NEWARK MINERALOGICAL SOCIETY

Newark Technical School, November 7, 1920.

The November meeting was called to order Vice-President Holzman, with eleven members present. After the reading of the minutes, election of officers for the ensuing year was held, resulting as follows: Pres., P. Walther; Vice Pres., J. Holzman; Treas., H. M. Lehman; the secretary's declining to serve another term caused two ballots to be taken, but as he was elected in both, the present secretary decided to continue. Prior to this meeting there had been no change in officers since the Club was organized; but Dr. Colton, having retired as head of the Newark Technical School and moved to upper New York state, could not continue as president, much as the Club desired him to do so.

WM. H. BROADWELL, *Secretary.*

PHILADELPHIA MINERALOGICAL SOCIETY

Wagner Free Institute of Science, November 11, 1920.

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the president, Dr. Hawkins, in the chair. Thirteen members and two visitors were present.

The executive council reported favorably upon the nomination of Mr. Ralph W. Emerson, and upon motion, he was elected. The following committee was elected to devise ways and means for the publication of Mr. Gordon's "Mineralogy of Pennsylvania": Dr. Hawkins, Dr. Wherry, Mr. Trudell, and Mr. Ford.

Mr. Trudell then described the Society's trip on Sunday, November 7th, to Greystone, N. Y., to see the magnificent collection of Col. William Boyce Thompson. The following members had attended: Biernbaum, Boyle, Flack, Ford, Frankenfield, Gordon, Knabe, Trudell, Vanartsdalen, and Wherry. Mr. Trudell described the collection in detail, from notes taken during the visit, altho stating that it was impossible to do it justice, and that it must be seen to be appreciated. It is in a basement room, housed in metal and glass wall cases, the joints being dust-proof, and filters being provided above and below to remove all dust from the air passing in and out as the temperature changes. Lighting is accomplished by completely concealed incandescent lights, and every specimen has been placed so as to be illuminated to the best advantage. All supports are of glass, and the labels are painted in neat letters on small glass slips. Practically every showy and beautiful mineral known is represented by the finest specimen now obtainable, and such minerals as gem tourmaline are present in dozens if not hundreds of crystals.

Mr. Gordon exhibited albite crystals from Rock Springs, Md., and magnetite crystals on deweylite from Sylmar, Pa. Mr. Frankenfield reported a trip to Romansville and Embreeville, Chester County, with Messrs. Trudell, Gordon, and Oldach. Dr. Hawkins described pyrite from Kingsbridge, N. Y., epidote from Pascoag, R. I., and hematite from Manton, R. I., the latter with two new forms.

SAMUEL G. GORDON, *Secretary.*

NEW YORK MINERALOGICAL CLUB

The regular monthly meeting of the New York Mineralogical Club was held in the Assembly Room of the American Museum of Natural History on the evening of November 17th, at 8.00 P.M. The President, Dr. George F. Kunz, presided, and there was an attendance of 20 members and guests. The minutes of the last meeting were read and approved. The following names were submitted to the Committee on Nominations:—Messrs B. Halpren, Chas. P. Curtis, and R. S. Newshan.

The Recording Secretary exhibited a specimen of the new species *césarolite* from Sidi-Amor, Tunis, recently described by Buttgenbach and Gillet.

In introducing the speaker of the evening, Prof. James F. Kemp, the President called attention to the fact that among the many scientific societies which claimed Dr. Kemp among their members was the New York Mineralogical Club; he also spoke of Prof. Kemp's qualifications, as an eminent mining geologist, to discuss the minerals of Bingham Canyon, Utah.

Dr. Kemp described the location of Bingham, 35 kilometers (20 miles) southwest of Salt Lake City, and spoke of its physiographic features, illustrating by means of a map sketched on the black board. He described the range geologically as a synclinal trough cut across by valleys. The rocks exposed, consisting mainly of sandstone, amount to some 3,000 to 3,500 meters in thickness. The passage of sandstone to limestone is quite abrupt. The ore favors the limestones, the large sulfide bodies occurring in the Jordan and Commercial limestones, which he believed to be the same respectively as the Highland Boy and Yampa limestones of Carr Fork. He described the oxidation of the sulfides of copper and iron in the Utah Copper Co. ore bodies in shattered intrusive monzonite as yielding copper sulfate solutions, which, filtering down on the lower sulfides, produced the enriched zone of chalcocite, which is the chief source of the copper.

Reviewing briefly the history of the district, he touched upon the early period when placer gold was discovered in the gravels of Bingham Canyon. Subsequently silver-bearing galenite was found on the Old Jordan and other claims and attempts were made to mine this for lead and silver. With the discovery of the cyanide process an attempt was also made to apply this process to the recovery of the gold known to exist in rusty outcrops, but the venture was a failure. The work led, however, to the discovery of great deposits of pyrite and chalcopyrite in the limestones. The district then became a large producer of copper from the Highland Boy Mine, and other similar deposits.

He characterized the ore as a replacement in limestone. Where intrusive rocks, usually called monzonite, penetrate the sedimentary strata, their metamorphic action tends to whiten the otherwise dark limestone. The metamorphic zone is marked by microscopic or larger diopside, wollastonite and garnet, associated with white marble. At the point where the metamorphic white limestone passes to the black unaltered variety the character of the ore minerals changes, chalcopyrite characterizing the white limestone and galenite and sphalerite the black.

Bingham is famous for large and handsome crystallized specimens of pyrite which are especially fine in the Commercial Mine. Occasionally tet-

rahedrite has been found. The crystals project into cavities or vugs in the huge replacement bodies of massive sulfides. The speaker exhibited a pentagonal dodecahedron of pyrite over 15 cm. in diameter. Sometimes also crystallized galenite is met with.

Dr. Kemp mentioned also the curious hydrated aluminium-iron silicate which has been called, by Prof. Alex. N. Winchell, "racewinite" from the cable address (*Racewin*) of H. V. Winchell, the discoverer. He described the occurrence and quoted an analysis of this rare silicate, remarking that one would think it a variety of serpentine whereas it consists chiefly of silica, alumina and water, with very minor iron and lime and almost no magnesia. He also noted that molybdenite occurs in occasional flakes. During the latter portion of his address Dr. Kemp showed a number of highly interesting lantern slides illustrating the various mines and the general topography of the district.

On a motion by Mr. Ashby a vote of thanks was tendered to Prof. Kemp for his interesting and valuable paper. The meeting adjourned at 9.30 P.M.

HERBERT P. WHITLOCK, *Recording Secretary.*

ABSTRACTS—CRYSTALLOGRAPHY

THE EPIDOTE OF MONTE BIANCO, WITH SPECIAL REFERENCE TO THE TERM CLINOZOISITE. TERESA SILIPRANDI. *Riv. min. crist. Ital.*, **47**, 61-78, 1916.

The crystallography of the mineral is described in detail, many forms new to the locality being noted. Determinations of specific gravity gave 3.375 to 3.385, and of refractive index β 1.713 to 1.717. These properties indicate the material to be really clinozoisite, probably containing not over 2 per cent. of ferric oxide.

E. T. W.

THE APPLICATION OF THE HEAPING-UP METHOD TO TWO-CIRCLE CRYSTAL MEASUREMENT. T. J. WOYNO. Zurich, Switzerland. *Centr. Min. Geol.* **1918**, 107-120, 142-152.

Crystals with curved or otherwise imperfect faces often yield images of the goniometer signal in other than the correct positions. By making a sufficient number of observations, and plotting the results in graphic diagrams, the true position of the forms concerned can be determined. Altho originally suggested for one circle measurement [original article not yet accessible in America. ABSTR.] it is especially adapted for use with the 2-circle method, since in this crystals can be studied which would be hopeless for one-circle zone measurement. The author gives a series of formulas for interpreting the results obtained, and illustrates the method by data on some rounded crystals of sphalerite from Tiffin, Ohio.

E. T. W.

CERTAIN RELATIONS BETWEEN CRYSTALLINE FORM, CHEMICAL CONSTITUTION AND OPTICAL PROPERTIES IN ORGANIC COMPOUNDS. EDGAR T. WHERRY. *J. Wash. Acad. Sci.*, **8**, 277-285, 319-327, 1918.

By calculating the refractivities corresponding to the refractive indices ω and ϵ in some tetragonal organic compounds, it is shown that the ratio between them is in many cases inversely proportional to the ratio between the corresponding crystallographic axes a and c . The probable arrangements of the atoms in some of the compounds are deduced from these relations.

E. T. W.

THE APPLICATION OF OPTICAL METHODS OF IDENTIFICATION TO ALKALOIDS AND OTHER ORGANIC COMPOUNDS. EDGAR T. WHERRY. *U. S. Dept. Agr. Bull.* **679**, 9 pages, 1918.

An outline of the optical methods useful in determining crystalline substances, with special reference to the modifications of the general procedures necessary when organic compounds are under study. E. T. W.

THE IDENTIFICATION OF THE CINCHONA ALKALOIDS BY OPTICAL-CRYSTALLOGRAPHIC MEASUREMENTS. EDGAR T. WHERRY AND ELIAS YANOVSKY. *J. Am. Chem. Soc.*, **40** (7), 1063-1074, (and 1955-1956), 1918.

The optical properties of these substances are described in detail, and their applicability to identification pointed out. E. T. W.

CRYSTALLOGRAPHY AND OPTICAL PROPERTIES OF THREE ALDOPENTOSEs. EDGAR T. WHERRY. *J. Am. Chem. Soc.*, **40** (12), 1852-1858, 1918.

The crystals were measured on the 2-circle goniometer, and are described, with figures. Optical data were determined in light of different wave-lengths, and their application to the identification of the substances is outlined.

E. T. W.

ABSTRACTS—MINERALOGY

A REMARKABLE OCCURRENCE OF CHROMIUM-TOURMALINE AND RUTILE IN THE BARBERTON DISTRICT. A. L. HALL. *Trans. Geol. Soc. S. Africa*, **20**, 51-52, 1918.

Green chromium-tourmaline occurs with pink rutile in talc, associated with talc schist and serpentine near intrusive granitic rocks. S. G. G.

SPECTRUM-PHENOMENA IN THE CHROMIUM COMPOUNDS. JAMES MOIR. *Trans. Royal Soc. S. Africa*, **7** (2), 129-130, 1918.

A description of experiments made to endeavor to reproduce the absorption spectra shown by ruby and emerald. Chromium compounds were dissolved in concentrated acids, especially sulfuric and phosphoric. The resulting solutions gave spectra most similar to that of emerald, tho suggesting that of ruby in certain respects. E. T. W.

WOLLASTONITE, $\text{CaO} \cdot \text{SiO}_2$, AND RELATED SOLID SOLUTIONS IN THE TERNARY SYSTEM LIME-MAGNESIA-SILICA. J. B. FERGUSON and H. E. MERWIN. *Geophys. Lab. Am. J. Sci.*, [4], **48**, 165-189, 1919.

By fusing the constituents and studying the products optically, the existence of several types of solid solution and of one new compound have been discovered. Diopside, oakermanite, and the new compound $5\text{CaO} \cdot 2\text{MgO} \cdot 6\text{SiO}_2$ all form solid solutions in wollastonite and in pseudowollastonite.

E. T. W.

THE MINES AND MINERALS OF LEADHILLS. ROBERT BROWN. Dumfriesshire and Galloway Nat. Hist. and Antiquarian Soc., *Trans. and J. of Proc.* [3], **6**, 124-137, 1919.

THE PRODUCTION OF PLATINUM FOR THE YEAR 1918. GEORGE F. KUNZ. *Min. Ind.*, 27, 569-581, 1919.

In addition to statistics, this paper includes notes on occurrences of platinum in Alaska, Australia, Canada, Colombia, Madagascar, and Rhodesia as well as on the discrediting of certain reports of its occurrence in Arizona and Idaho. E. T. W.

THE PRODUCTION OF PRECIOUS STONES FOR THE YEAR 1918. GEORGE F. KUNZ. *Min. Ind.*, 27, 604-628, 1919.

Contains data on: diamonds in South Africa, including the record of the finding of an exceptionally fine blue-white diamond weighing 388.25 carats at the Jagersfontein mine; diamonds in Arkansas, reporting the finding of some very fine stones, the largest being a yellow octahedron weighing 17.85 carats; opal in the northern part of Humboldt Co., Nevada, in large masses up to over \$5000 in value; and a number of other less important occurrences. E. T. W.

A METHOD FOR THE QUICK DETERMINATION OF THE APPROXIMATE AMOUNT AND COMPOSITION OF THE NICKEL-IFEROUS IRON IN METEORITES; AND ITS APPLICATION TO SEVENTEEN METEORIC STONES. G. T. PRIOR. *Mineral. Mag.*, 18, 349-354, 1919.

A convenient classification of meteorites is one based on the ratio of iron to nickel in the nickeliferous iron they contain. The author outlines a simple chemical method which consists of separating the attracted portion by means of a magnetic comb. The adhering impurities are removed and the metal dissolved in aqua regia. From the amount of sulfur present, the quantity of troilite is computed. The nickel is precipitated with dimethyl glyoxime and the iron determined by difference. The application of this method gave perfectly reliable results. W. F. H.

THE ORIGIN OF METEORITES. STANISLAS MEUNIER. *Bull. soc. geol. franc.*, 4, 202-213, 1918.

The writer finds volcanic and metamorphic types of meteorites to exist. The source of meteorites is thought to be the dismemberment of a globe similar to ours. C. B. SLAWSON.

SOME RECENT FALLS OF AEROLITES IN INDIA. H. WALKER. *Proc. Asiatic Soc. Bengal*, 15, excvii, 1919.

The falls of the following aerolites are noted: July 10, 1916, at Sultanpur, Bolia district, five fragments recovered aggregating 1,710.57 grams; November 21, 1916, at Rampurhat, Birbhum district, a nearly complete specimen weighing 99.93 grams; February 20, 1917, at Ranchapar, Sonthal Parganas, 4 pieces recovered totaling 366.87 grams; July 3, 1917, at Cranganore in Cochin State, 6 fragments aggregating 1,460.24 grams were recovered. S. G. GORDON.